

Complete Summary

GUIDELINE TITLE

ACC/AHA 2002 guideline update for the management of patients with unstable angina and non-ST-segment elevation myocardial infarction. A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee on the Management of Patients With Unstable Angina).

BIBLIOGRAPHIC SOURCE(S)

American College of Cardiology Foundation, American Heart Association. ACC/AHA guidelines for the management of patients with unstable angina and non-ST-segment elevation myocardial infarction. A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. Bethesda (MD): American College of Cardiology Foundation (ACCF); 2002 Mar. 95 p. [552 references]

COMPLETE SUMMARY CONTENT

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SCOPE

DISEASE/CONDITION(S)

- Coronary artery disease
- Unstable angina
- Non-ST-segment elevation myocardial infarction

GUIDELINE CATEGORY

Diagnosis
 Evaluation
 Management
 Prevention

Risk Assessment
Treatment

CLINICAL SPECIALTY

Cardiology
Emergency Medicine
Family Practice
Geriatrics
Internal Medicine
Thoracic Surgery

INTENDED USERS

Health Care Providers
Hospitals
Physicians

GUIDELINE OBJECTIVE(S)

- To assist both cardiovascular specialists and nonspecialists in the proper evaluation and management of patients with an acute onset of symptoms suggestive of unstable angina and non-ST-segment elevation myocardial infarction (UA/NSTEMI)
- To provide recommendations and supporting evidence for the continued management of patients with these conditions in both inpatient and outpatient settings

TARGET POPULATION

Adult patients with unstable angina and non-ST-segment elevation myocardial infarction (UA/NSTEMI).

Special populations considered, including women, patients with diabetes mellitus, post-coronary artery bypass (CABG) patients, the elderly, cocaine users, patients with variant (Prinzmetal's) angina, and patients with syndrome X

Excluded from these guidelines are:

- Patients diagnosed as having an acute myocardial infarction suitable for reperfusion (with ST-segment elevation). These patients should be managed as indicated according to the American College of Cardiology/American Heart Association (ACC/AHA) Guidelines for Management of Patients with Acute Myocardial Infarction. (Patients with acute myocardial infarction and with definite ischemic electrocardiogram changes who are not suitable for acute reperfusion should be diagnosed and managed as patients with unstable angina.)
- Patients who experience periprocedural myocardial damage that is reflected in release of the MB isoenzyme of creatine phosphokinase.

- Patients with initial diagnosis of acute coronary syndrome who are ultimately proven to have a noncardiac cause for the initial clinical presentation that was suggestive of acute coronary syndrome.

INTERVENTIONS AND PRACTICES CONSIDERED

Clinical Assessment and Tools for Risk Stratification and Triage

1. 12-lead electrocardiogram (ECG)
2. Medical history
3. Physical exam
4. Stress testing (pharmacologic and non-pharmacologic)
5. Echocardiogram
6. Radionuclide angiogram
7. Measurement of biochemical cardiac markers, including cardiac muscle isoenzyme of creatine phosphokinase (CK-MB) with or without isoforms, myoglobin, and cardiac troponins
8. Measurement of C-reactive protein levels
9. Coronary angiography

Treatment/Management

1. Anti-Ischemic Therapy
 - Bed rest and supplemental oxygen therapy
 - Nitrates, including nitroglycerin (sublingual, spray, transdermal, intravenous), and others
 - Morphine sulfate
 - Beta-adrenergic blockers (propranolol, metoprolol, esmolol, and others)
 - Calcium antagonists, such as amlodipine, verapamil, or diltiazem
 - Angiotensin-converting enzyme (ACE) inhibitors
2. Antiplatelet and anticoagulation therapy
 - Aspirin (ASA)
 - Clopidogrel (Plavix), ticlopidine
 - Unfractionated heparin
 - Low-molecular-weight heparins, such as enoxaparin, dalteparin, and tinzaparin, nadroparin
 - Hirudin and other direct thrombin inhibitors
 - Long-term anticoagulants, such as coumadin and warfarin
 - Platelet glycoprotein IIb/IIIa receptor antagonists such as abciximab, tirofiban, and eptifibatide
3. Coronary revascularization procedures
 - Percutaneous coronary interventions (PCI)
 - Platelet inhibitors in conjunction with percutaneous revascularization
 - Coronary artery bypass graft (CABG) surgery
4. Post-discharge follow-up, including interventions for long-term drug therapy and risk factor modification
 - Patient instructions regarding daily exercise, activities of daily living, smoking cessation, hypertension control, tight control of hyperglycemia in diabetic patients, and pharmacologic agents to alter lipid levels.

- Referral of the smoking patient to smoking cessation program or clinic and/or outpatient cardiac rehabilitation program

MAJOR OUTCOMES CONSIDERED

- Sensitivity, specificity, and accuracy of diagnostic tests
- Risk of death or nonfatal myocardial infarction
- Morbidity and mortality associated with unstable angina and non-ST-segment elevation myocardial infarction
- Quality of life

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)
Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

The committee members reviewed and compiled published reports through a series of computerized literature searches of the English-language literature since 1994 and a final manual search of selected articles. Details of the specific searches conducted for particular sections were provided when appropriate.

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

- The weight of the evidence was ranked highest (A) if the data were derived from multiple randomized clinical trials that involved large numbers of patients
- Intermediate (B) if the data were derived from a limited number of randomized trials that involved small numbers of patients or from careful analyses of nonrandomized studies or observational registries, and
- A low rank (C) was given when expert consensus was the primary basis for the recommendation.

METHODS USED TO ANALYZE THE EVIDENCE

Meta-Analysis of Randomized Controlled Trials
Review of Published Meta-Analyses
Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Detailed evidence tables were developed whenever necessary with the specific criteria outlined in the individual sections of the original guideline document.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Experts in the subject under consideration are selected from the American College of Cardiology and the American Heart Association to examine subject-specific data and write guidelines. The process includes additional representatives from other medical specialty groups when appropriate. Writing groups are specifically charged to perform a formal literature review, weigh the strength of evidence for or against a particular treatment or procedure, and include estimates of expected health outcomes where data exist. Patient-specific modifiers, comorbidities, and issues of patient preference that might influence the choice of particular tests or therapies are considered as well as frequency of follow-up and cost-effectiveness.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Class I: Conditions for which there is evidence for and/or general agreement that the procedure or treatment is useful and effective.

Class II: Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness/ efficacy of a procedure or treatment.

Class IIa: The weight of evidence or opinion is in favor of the procedure or treatment.

Class IIb: Usefulness/efficacy is less well established by evidence or opinion.

Class III: Conditions for which there is evidence and/or general agreement that the procedure or treatment is not useful/effective and in some cases may be harmful.

COST ANALYSIS

Several groups have studied the impact of chest pain units on the care of patients with chest pain who present to the emergency department. It has been reported, both from studies with historical controls and from randomized trials, that the use of chest pain units is cost saving compared with an in-hospital evaluation to "rule-out myocardial infarction (MI)".

A common clinical practice is to minimize the chance of "missing" an MI in a patient with chest discomfort by admitting to the hospital all patients with suspected acute coronary syndrome (ACS) and by obtaining serial 12-lead electrocardiograms and biochemical cardiac marker measurements to either

exclude or confirm the diagnosis of MI. Such a practice typically results in a low percentage of admitted patients actually being confirmed to have an MI. Given the inverse relationship between the percentage of patients with a "rule-out MI evaluation" and the "MI miss rate," the potential cost savings of a chest pain unit varies depending on the practice pattern for the disposition of chest pain patients at individual hospitals. Hospitals with a high admission rate of low-risk patients to "rule-out MI" (70% to 80%) will experience the largest cost savings by implementing a chest pain unit approach but will have the smallest impact on the number of missed MI patients. In contrast, hospitals with relatively low admission rates of such patients (30% to 40%) will experience greater improvements in the quality of care because fewer MI patients will be missed but will have a smaller impact on costs because of the low baseline admission rate.

METHOD OF GUIDELINE VALIDATION

External Peer Review
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

The original 2000 document was reviewed by 3 outside reviewers nominated by each of the American College of Cardiology (ACC), American Heart Association (AHA), and the American College of Emergency Physicians (ACEP); 1 outside reviewer nominated by each of the American Academy of Family Physicians (AAFP), American College of Physicians-American Society of Internal Medicine (ACP-ASIM), European Society of Cardiology, and the Society of Thoracic Surgeons (STS); and 29 outside reviewers nominated by the Committee. The 2002 update was reviewed by 2 outside reviewers nominated by each of the American College of Cardiology and the American Heart Association. The document was approved for publication by the governing bodies of the American College of Cardiology and the American Heart Association.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

The American College of Cardiology/American Heart Association (ACC/AHA) classification of the recommendations for patient evaluation and treatment (classes I-III) and the levels of evidence (A-C) are defined at the end of the Major Recommendations field.

- I. Initial Evaluation and Management
 - A. Clinical Assessment
 - Initial Triage
 - Class I
 1. Patients with symptoms that suggest possible acute coronary syndrome (ACS) should not be evaluated solely over the telephone but should be referred to a facility that allows evaluation by a physician and the recording of a 12-lead electrocardiogram (ECG). (Level of Evidence: C)

2. Patients with a suspected ACS with chest discomfort at rest for greater than 20 min, hemodynamic instability, or recent syncope or presyncope should be strongly considered for immediate referral to an emergency department (ED) or a specialized chest pain unit. Other patients with a suspected ACS may be seen initially in an emergency department, a chest pain unit, or an outpatient facility. (Level of Evidence: C)

B. Early Risk Stratification

Class I

1. A determination should be made in all patients with chest discomfort of the likelihood of acute ischemia caused by coronary artery disease (CAD) as high, intermediate, or low. (Level of Evidence: C)
2. Patients who present with chest discomfort should undergo early risk stratification that focuses on anginal symptoms, physical findings, ECG findings, and biomarkers of cardiac injury. (Level of Evidence: B)
3. A 12-lead ECG should be obtained immediately (within 10 min) in patients with ongoing chest discomfort and as rapidly as possible in patients who have a history of chest discomfort consistent with ACS but whose discomfort has resolved by the time of evaluation. (Level of Evidence: C)
4. Biomarkers of cardiac injury should be measured in all patients who present with chest discomfort consistent with ACS. A cardiac-specific troponin is the preferred marker, and if available, it should be measured in all patients. Creatine kinase-cardiac muscle isoenzyme (CK-MB) by mass assay is also acceptable. In patients with negative cardiac markers within 6 h of the onset of pain, another sample should be drawn in the 6- to 12-h time frame (e.g., at 9 h after the onset of symptoms). (Level of Evidence: C)

Class IIa

5. For patients who present within 6 h of the onset of symptoms, an early marker of cardiac injury (e.g., myoglobin or CK-MB subforms) should be considered in addition to a cardiac troponin. (Level of Evidence: C)

Class IIb

6. C-reactive protein (CRP) and other markers of inflammation should be measured. (Level of Evidence: B)

Class III

7. Total creatine kinase (without cardiac muscle isoenzyme), aspartate aminotransferase (AST, SGOT), beta-hydroxybutyric dehydrogenase, and/or lactate dehydrogenase should be the markers for the detection of myocardial injury in patients with chest discomfort suggestive of ACS. (Level of Evidence: C)

Noncardiac Causes of Exacerbation of Symptoms Secondary to Myocardial Ischemia

Class I

8. The initial evaluation of the patient with suspected ACS should include a search for noncoronary causes that could explain the development of symptoms. (Level of Evidence: C)

C. Immediate Management

Class I

1. The history, physical examination, 12-lead ECG, and initial cardiac marker tests should be integrated to assign patients with chest pain into 1 of 4 categories: a noncardiac diagnosis, chronic stable angina, possible ACS, and definite ACS. (Level of Evidence: C)
2. Patients with definite or possible ACS but whose initial 12-lead ECG and cardiac marker levels are normal, should be observed in a facility with cardiac monitoring (e.g., chest pain unit), and a repeat ECG and cardiac marker measurement should be obtained 6 to 12 h after the onset of symptoms. (Level of Evidence: B)
3. In patients in whom ischemic heart disease is present or suspected, if the follow-up 12-lead ECG and cardiac marker measurements are normal, a stress test (exercise or pharmacological) to provoke ischemia may be performed in the emergency department, in a chest pain unit, or on an outpatient basis shortly after discharge. Low-risk patients with a negative stress test can be managed as outpatients. (Level of Evidence: C)
4. Patients with definite ACS and ongoing pain, positive cardiac markers, new ST-segment deviations, new deep T-wave inversions, hemodynamic abnormalities, or a positive stress test should be admitted to the hospital for further management. (Level of Evidence: C)
5. Patients with possible ACS and negative cardiac markers who are unable to exercise or who have an abnormal resting ECG should undergo a pharmacological stress test. (Level of Evidence: B)
6. Patients with definite ACS and ST-segment elevation should be evaluated for immediate reperfusion therapy. (Level of Evidence: A)

II. Hospital Care

A. Anti-Ischemic Therapy

Class I

1. Bed rest with continuous ECG monitoring for ischemia and arrhythmia detection in patients with ongoing rest pain. (Level of Evidence: C)
2. Nitroglycerin (NTG), sublingual tablet or spray, followed by intravenous administration, for immediate relief of ischemia and associated symptoms. (Level of Evidence: C)
3. Supplemental oxygen for patients with cyanosis or respiratory distress; finger pulse oximetry or arterial blood gas determination to confirm adequate arterial oxygen saturation

- (SaO₂ greater than 90%) and continued need for supplemental oxygen in the presence of hypoxemia. (Level of Evidence: C)
4. Morphine sulfate intravenously when symptoms are not immediately relieved with NTG or when acute pulmonary congestion and/or severe agitation is present. (Level of Evidence: C)
 5. A beta-blocker, with the first dose administered intravenously if there is ongoing chest pain, followed by oral administration, in the absence of contraindications. (Level of Evidence: B)
 6. In patients with continuing or frequently recurring ischemia when beta-blockers are contraindicated, a nondihydropyridine calcium antagonist (e.g., verapamil or diltiazem), as initial therapy in the absence of severe left ventricular (LV) dysfunction or other contraindications. (Level of Evidence: B)
 7. An angiotensin-converting enzyme inhibitor (ACEI) when hypertension persists despite treatment with NTG and a beta-blocker in patients with LV systolic dysfunction or congestive heart failure (CHF) and in ACS patients with diabetes. (Level of Evidence: B)

Class II a

8. Oral long-acting calcium antagonists for recurrent ischemia in the absence of contraindications and when beta-blockers and nitrates are fully used. (Level of Evidence: C)
9. An ACEI for all post-ACS patients. (Level of Evidence: B)
10. Intra-aortic balloon pump (IABP) counterpulsation for severe ischemia that is continuing or recurs frequently despite intensive medical therapy or for hemodynamic instability in patients before or after coronary angiography. (Level of Evidence: C)

Class II b

11. Extended-release form of nondihydropyridine calcium antagonists instead of a beta-blocker. (Level of Evidence: B)
12. Immediate-release dihydropyridine calcium antagonists in the presence of a beta-blocker. (Level of Evidence: B)

Class III

13. NTG or other nitrate within 24 hours of sildenafil (Viagra) use. (Level of Evidence: C)
14. Immediate-release dihydropyridine calcium antagonists in the absence of a beta-blocker. (Level of Evidence: A)

B. Antiplatelet and Anticoagulation Therapy

Class I

1. Antiplatelet therapy should be initiated promptly. Aspirin (ASA) should be administered as soon as possible after presentation and continued indefinitely. (Level of Evidence: A)

2. Clopidogrel should be administered to hospitalized patients who are unable to take ASA because of hypersensitivity or major gastrointestinal intolerance. (Level of Evidence: A)
3. In hospitalized patients in whom an early noninterventional approach is planned, clopidogrel should be added to ASA as soon as possible on admission and administered for at least 1 month (Level of Evidence: A) and for up to 9 months (Level of Evidence: B).
4. In patients for whom percutaneous coronary intervention (PCI) is planned, and who are not at high risk for bleeding, clopidogrel should be started and continued for at least 1 month (Level of Evidence: A) and up to 9 months in patients who are not at high risk for bleeding (Level of Evidence: B).
5. In patients taking clopidogrel in whom elective coronary artery bypass graft (CABG) surgery is planned, the drug should be withheld for 5 to 7 days. (Level of Evidence: B).
6. Anticoagulation with subcutaneous low-molecular-weight heparin (LMWH) or intravenous unfractionated heparin (UFH) should be added to antiplatelet therapy with ASA and/or clopidogrel. (Level of Evidence: A)
7. A platelet glycoprotein IIb/IIIa (GP IIb/IIIa) antagonist should be administered, in addition to ASA and heparin, to patients in whom catheterization and PCI are planned. The GP IIb/IIIa antagonist may also be administered just prior to PCI (Level of Evidence: A).

Class IIa

8. Eptifibatide or tirofiban should be administered in addition to ASA and LMWH or UFH, to patients with continuing ischemia, an elevated troponin or with other high-risk features in whom an invasive management strategy is not planned. (Level of Evidence: A).
9. Enoxaparin is preferable to UFH as an anticoagulant in patients with unstable angina/non-ST-segment elevation myocardial infarction (UA/NSTEMI) in the absence of renal failure and unless CABG is planned within 24 hours. (Level of Evidence: A).
10. A platelet GP IIb/IIIa antagonist should be administered to patients already receiving heparin, ASA, and clopidogrel in whom catheterization and PCI are planned. The GP IIb/IIIa antagonist may also be administered just prior to PCI. (Level of Evidence: B).

Class IIb

11. Eptifibatide or tirofiban, in addition to ASA and LMWH or UFH, to patients without continuing ischemia who have no other high-risk features and in whom PCI is not planned. (Level of Evidence: A).

Class III

12. Intravenous fibrinolytic therapy in patients without acute ST-segment elevation, a true posterior myocardial infarction (MI), or a presumed new left bundle-branch block (LBBB). (Level of Evidence: A)
13. Abciximab administration in patients in whom PCI is not planned. (Level of Evidence: A).

C. Risk Stratification

Class I

1. Noninvasive stress testing in low-risk patients (See Table 6 in the original guideline document) who have been free of ischemia at rest or with low-level activity and of CHF for a minimum of 12 to 24 h. (Level of Evidence: C)
2. Noninvasive stress testing in patients at intermediate risk (See Table 6 in the original guideline document) who have been free of ischemia at rest or with low-level activity and of CHF for a minimum of 2 or 3 days. (Level of Evidence: C)
3. Choice of stress test is based on the resting ECG, ability to perform exercise, local expertise, and technologies available. Treadmill exercise is suitable in patients able to exercise in whom the ECG is free of baseline ST-segment abnormalities, bundle-branch block, LV hypertrophy, intraventricular conduction defect, paced rhythm, preexcitation, and digoxin effect. (Level of Evidence: C)
4. An imaging modality is added in patients with resting ST-segment depression (greater than or equal to 0.10 mV), LV hypertrophy, bundle-branch block, intraventricular conduction defect, preexcitation, or digoxin who are able to exercise. In patients undergoing a low-level exercise test, an imaging modality may add sensitivity. (Level of Evidence: B)
5. Pharmacological stress testing with imaging when physical limitations (e.g., arthritis, amputation, severe peripheral vascular disease, severe chronic obstructive pulmonary disease [COPD], general debility) preclude adequate exercise stress. (Level of Evidence: B)
6. Prompt angiography without noninvasive risk stratification for failure of stabilization with intensive medical treatment. (Level of Evidence: B)

Class IIa

7. A noninvasive test (echocardiogram or radionuclide angiogram) to evaluate LV function in patients with definite ACS who are not scheduled for coronary arteriography and left ventriculography. (Level of Evidence: C)

D. Early Conservative Versus Invasive Strategies

Class I

1. An early invasive strategy in patients with UA/NSTEMI without serious comorbidity and who have any of the following high-risk indicators (Level of Evidence: A):
 - a. Recurrent angina/ischemia at rest or with low-level activities despite intensive anti-ischemic therapy
 - b. Elevated troponin T (TnT) or troponin I (TnI)

- c. New or presumably new ST-segment depression
 - d. Recurrent angina/ischemia with CHF symptoms, an S₃ gallop, pulmonary edema, worsening rales, or new or worsening mitral regurgitation
 - e. High-risk findings on noninvasive stress testing
 - f. Depressed LV systolic function (e.g., ejection fraction [EF] less than 0.40 on noninvasive study)
 - g. Hemodynamic instability
 - h. Sustained ventricular tachycardia
 - i. PCI within 6 months
 - j. Prior coronary artery bypass graft (CABG)
2. In the absence of these findings, either an early conservative or an early invasive strategy in hospitalized patients without contraindications for revascularization. (Level of Evidence: B)

Class IIa

- 3. An early invasive strategy in patients with repeated presentations for ACS despite therapy and without evidence of ongoing ischemia or high risk. (Level of Evidence: C)

Class III

- 4. Coronary angiography in patients with extensive comorbidities (e.g., liver or pulmonary failure, cancer), in whom risks of revascularization are not likely to outweigh the benefits. (Level of Evidence: C)
- 5. Coronary angiography in patients with acute chest pain and a low likelihood of ACS. (Level of Evidence: C)
- 6. Coronary angiography in patients who will not consent to revascularization regardless of the findings. (Level of Evidence: C)

III. Coronary Revascularization

A. Revascularization With PCI and CABG in Patients With UA/NSTEMI

Class I

- 1. CABG for patients with significant left main CAD. (Level of Evidence: A)
- 2. CABG for patients with 3-vessel disease; the survival benefit is greater in patients with abnormal LV function (ejection fraction less than 0.50). (Level of Evidence: A)
- 3. CABG for patients with 2-vessel disease with significant proximal left anterior descending CAD and either abnormal LV function (ejection fraction less than 0.50) or demonstrable ischemia on noninvasive testing. (Level of Evidence: A)
- 4. PCI or CABG for patients with 1- or 2-vessel CAD without significant proximal left anterior descending CAD but with a large area of viable myocardium and high-risk criteria on noninvasive testing. (Level of Evidence: B)
- 5. PCI for patients with multivessel coronary disease with suitable coronary anatomy, with normal LV function and without diabetes. (Level of Evidence: A)

6. Intravenous platelet GP IIb/IIIa inhibitor in UA/NSTEMI patients undergoing PCI. (Level of Evidence: A)

Class IIa

7. Repeat CABG for patients with multiple saphenous vein graft (SVG) stenoses, especially when there is significant stenosis of a graft that supplies the left anterior descending coronary artery (LAD). (Level of Evidence: C)
8. PCI for focal saphenous vein graft lesions or multiple stenoses in poor candidates for reoperative surgery. (Level of Evidence: C)
9. PCI or CABG for patients with 1- or 2-vessel CAD without significant proximal left anterior descending CAD but with a moderate area of viable myocardium and ischemia on noninvasive testing. (Level of Evidence: B)
10. PCI or CABG for patients with 1-vessel disease with significant proximal left anterior descending CAD. (Level of Evidence: B)
11. CABG with the internal mammary artery for patients with multivessel disease and treated diabetes mellitus. (Level of Evidence: B)

Class IIb

12. PCI for patients with 2- or 3-vessel disease with significant proximal left anterior descending CAD, with treated diabetes or abnormal LV function, and with anatomy suitable for catheter-based therapy. (Level of Evidence: B)

Class III

13. PCI or CABG for patients with 1- or 2-vessel CAD without significant proximal left anterior descending CAD or with mild symptoms or symptoms that are unlikely due to myocardial ischemia or who have not received an adequate trial of medical therapy and who have no demonstrable ischemia on noninvasive testing. (Level of Evidence: C)
14. PCI or CABG for patients with insignificant coronary stenosis (less than 50% diameter). (Level of Evidence: C)
15. PCI in patients with significant left main CAD who are candidates for CABG. (Level of Evidence: B)

IV. Hospital Discharge and Post-Hospital Discharge Care

A. Medical Regimen

Postdischarge Therapy

Class I

1. Drugs required in the hospital to control ischemia should be continued after hospital discharge in patients who do not undergo coronary revascularization, patients with unsuccessful revascularization, or patients with recurrent symptoms after revascularization. Upward or downward titration of the doses may be required. (Level of Evidence: C)

2. All patients should be given sublingual or spray nitroglycerin (NTG) and instructed in its use. (Level of Evidence: C)
3. Before discharge, patients should be informed about symptoms of acute myocardial infarction (AMI) and should be instructed in how to seek help if symptoms occur. (Level of Evidence: C)

Long-Term Medical Therapy
Class I

4. Aspirin 75 to 325 mg per day in the absence of contraindications. (Level of Evidence: A)
5. Clopidogrel 75 mg daily (in the absence of contraindications) when ASA is not tolerated because of hypersensitivity or gastrointestinal intolerance. (Level of Evidence: A)
6. The combination of ASA and clopidogrel for 9 months after UA/NSTEMI. (Level of Evidence: B).
7. Beta-blockers in the absence of contraindications. (Level of Evidence: B)
8. Lipid-lowering agents and diet in post-ACS patients, including post-revascularization patients with low-density lipoprotein (LDL) cholesterol of greater than 130 mg/dL. (Level of Evidence: A)
9. Lipid-lowering agents if LDL cholesterol level after diet is greater than 100 mg/dL. (Level of Evidence: B)
10. Angiotensin-converting enzyme inhibitors (ACEIs) for patients with CHF, LV dysfunction (ejection fraction less than 0.40), hypertension, or diabetes. (Level of Evidence: A)

B. Postdischarge Follow-Up
Class I

1. Discharge instructions should include a follow-up appointment. Low-risk medically treated patients and revascularized patients should return in 2 to 6 weeks, and higher-risk patients should return in 1 to 2 weeks. (Level of Evidence: C)
2. Patients managed initially with a conservative strategy who experience recurrent unstable angina or severe (Canadian Cardiovascular Society [CCS] Class III) chronic stable angina despite medical management and who are suitable for revascularization should undergo coronary arteriography. (Level of Evidence: B)
3. Patients who have tolerable stable angina or no anginal symptoms at follow-up visits should be managed with long-term medical therapy for stable CAD. (Level of Evidence: B)

C. Use of Medications

1. Before hospital discharge, patients and/or designated responsible caregivers should be provided with well-understood instructions with respect to medication type, purpose, dose, frequency, and pertinent side effects. (Level of Evidence: C)
2. Anginal discomfort lasting greater than 2 or 3 min should prompt the patient to discontinue the activity or remove himself or herself from the stressful event. If pain does not subside immediately, the patient should be instructed to take NTG. If the first tablet or spray does not provide relief within 5 min,

then a second and third dose, at 5-min intervals, should be taken. Pain that lasts greater than 15 to 20 min or persistent pain despite 3 NTG doses should prompt the patient to seek immediate medical attention by calling 9-1-1 and going to the nearest hospital emergency department, preferably by ambulance or the quickest available alternative. (Level of Evidence: C)

3. If the pattern of anginal symptoms changes (e.g., pain that is more frequent or severe, or is precipitated by less effort or now occurs at rest), the patient should contact his or her physician to determine the need for additional treatment or testing. (Level of Evidence: C)

D. Risk Factor Modification

Class I

1. Specific instructions should be given regarding the following:
 - a. Smoking cessation and achievement or maintenance of optimal weight, daily exercise, and diet (Level of Evidence: B)
 - b. HMG-CoA (3-hydroxy-3-methylglutaryl coenzyme A) reductase inhibitors for LDL cholesterol of greater than 130 mg/dL. (Level of Evidence: A)
 - c. Lipid-lowering agent if LDL cholesterol after diet is greater than 100 mg/dL. (Level of Evidence: B)
 - d. A fibrate or niacin if high-density lipoprotein (HDL) cholesterol is less than 40 mg/dL, occurring as an isolated finding or in combination with other lipid abnormalities. (Level of Evidence: B).
 - e. Hypertension control to a blood pressure of less than 130 per 85 mm Hg (Level of Evidence: A)
 - f. Tight control of hyperglycemia in diabetes (Level of Evidence: B)
2. Consider the referral of patients who are smokers to a smoking cessation program or clinic and/or an outpatient cardiac rehabilitation program. (Level of Evidence: B)

Class IIa

3. HMG-CoA reductase inhibitors and diet for LDL cholesterol greater than 100 mg/dL begun 24 to 96 h after admission and continued at hospital discharge. (Level of Evidence: B).
4. Gemfibrozil or niacin in patients with HDL cholesterol of less than 40 mg/dL and triglycerides of greater than 200 mg/dL. (Level of Evidence: B)

Class I

5. Beyond the instructions for daily exercise, patients require specific instruction on activities (e.g., heavy lifting, climbing stairs, yard work, household activities) that are permissible and those that should be avoided. Specific mention should be made regarding resumption of driving and return to work. (Level of Evidence: C)

V. Special Groups

A. Women

Class I

1. Women with UA/NSTEMI should be managed in a manner similar to men. Specifically, women, like men with UA/NSTEMI, should receive ASA and clopidogrel. Indications for noninvasive and invasive testing are similar in women and men. (Level of Evidence: B)

B. Diabetes Mellitus

Class I

1. Diabetes is an independent risk factor in patients with UA/NSTEMI. (Level of Evidence: A)
2. Medical treatment in the acute phase and decisions on whether to perform stress testing and angiography and revascularization should be similar in diabetic and nondiabetic patients. (Level of Evidence: C)
3. Attention should be directed toward tight glucose control. (Level of Evidence: B)
4. For patients with multivessel disease, CABG with use of the internal mammary arteries is preferred over PCI in patients being treated for diabetes. (Level of Evidence: B)

Class II a

5. PCI for diabetic patients with 1-vessel disease and inducible ischemia. (Level of Evidence: B)
6. Abciximab for diabetics treated with coronary stenting. (Level of Evidence: B)

C. Post-CABG Patients

Class I

1. Medical treatment for post-CABG patients should follow the same guidelines as for non-post-CABG patients with UA/NSTEMI. (Level of Evidence: C)
2. Because of the many anatomic possibilities that might be responsible for recurrent ischemia, there should be a low threshold for angiography in post-CABG patients with UA/NSTEMI. (Level of Evidence: B)

Class II a

3. Repeat CABG is recommended for multiple saphenous vein graft (SVG) stenoses, especially when there is significant stenosis of a graft that supplies the left anterior descending coronary artery. PCI is recommended for focal saphenous vein stenosis. (Level of Evidence: C)
4. Stress testing should generally involve imaging in post-CABG patients. (Level of Evidence: C)

D. Elderly Patients

Class I

1. Decisions on management should reflect considerations of general health, comorbidities, cognitive status, and life expectancy. (Level of Evidence: C)

2. Attention should be paid to altered pharmacokinetics and sensitivity to hypotensive drugs. (Level of Evidence: B)
3. Intensive medical and interventional management of ACS may be undertaken but with close observation for adverse effects of these therapies. (Level of Evidence: B)

E. Cocaine

Class I

1. Nitroglycerin (NTG) and oral calcium antagonists for patients with ST-segment elevation or depression that accompanies ischemic chest discomfort. (Level of Evidence: C)
2. Immediate coronary arteriography, if possible, in patients whose ST segments remain elevated after NTG and calcium antagonists; thrombolysis (with or without PCI) if thrombus is detected. (Level of Evidence: C)

Class IIa

3. Intravenous calcium antagonists for patients with ST-segment deviation suggestive of ischemia. (Level of Evidence: C)
4. Beta-blockers for hypertensive patients (systolic blood pressure greater than 150 mm Hg) or those with sinus tachycardia (pulse greater than 100 bpm). (Level of Evidence: C)
5. Thrombolytic therapy if ST segments remain elevated despite NTG and calcium antagonists and coronary arteriography is not possible. (Level of Evidence: C)
6. Coronary arteriography, if available, for patients who have ST-segment depression or isolated T-wave changes not known to be old and who are unresponsive to NTG and calcium antagonists. (Level of Evidence: C)

Class III

7. Coronary arteriography in patients with chest pain without ST-T-wave changes. (Level of Evidence: C)

F. Variant (Prinzmetal's) Angina

Class I

1. Coronary arteriography in patients with episodic chest pain and ST-segment elevation that resolves with NTG and/or calcium antagonists. (Level of Evidence: B)
2. Treatment with nitrates and calcium antagonists in patients whose coronary arteriogram is normal or shows only nonobstructive lesions. (Level of Evidence: B)

Class IIa

3. Provocative testing in patients with a nonobstructive lesion on coronary arteriography, the clinical picture of coronary spasm, and transient ST-segment elevation. (Level of Evidence: B)

Class IIb

4. Provocative testing without coronary arteriography. (Level of Evidence: C)
5. In the absence of significant CAD on coronary arteriography, provocative testing with methylergonovine, acetylcholine, or methacholine when coronary spasm is suspected but there is no ECG evidence of transient ST-segment elevation. (Level of Evidence: C)

Class III

6. Provocative testing in patients with high-grade obstructive lesions on coronary arteriography. (Level of Evidence: B)

Patients With Syndrome X

Class I

7. Reassurance and medical therapy with nitrates, beta-blockers, and calcium antagonists alone or in combination. (Level of Evidence: B)
8. Risk factor reduction. (Level of Evidence: C)

Class IIb

9. Intracoronary ultrasound to rule out missed obstructive lesions. (Level of Evidence: B)
10. If no ECGs are available during chest pain and coronary spasm cannot be ruled out, coronary arteriography and provocative testing with methylergonovine, acetylcholine, or methacholine. (Level of Evidence: C)
11. Hormone replacement therapy (HRT) in postmenopausal women unless there is a contraindication. (Level of Evidence: C)
12. Imipramine for continued pain despite Class I measures. (Level of Evidence: C)

Class III

13. Medical therapy with nitrates, beta-blockers, and calcium antagonists for patients with noncardiac chest pain. (Level of Evidence: C)

Definitions:

Class I: Conditions for which there is evidence and/or general agreement that a given procedure or treatment is useful and effective.

Class II: Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of a procedure or treatment.

Class IIa: Weight of evidence/opinion is in favor of usefulness/efficacy.

Class IIb: Usefulness/efficacy is less well established by evidence/opinion.

Class III: Conditions for which there is evidence and/or general agreement that the procedure/treatment is not useful/effective and in some cases may be harmful.

Strength of Evidence

The weight of the evidence is ranked:

- Highest (A) if the data were derived from multiple randomized clinical trials that involved large numbers of patients
- Intermediate (B) if the data were derived from a limited number of randomized trials that involved small numbers of patients or from careful analyses of nonrandomized studies or observational registries; and
- Low (C) when expert consensus was the primary basis for the recommendation

CLINICAL ALGORITHM(S)

Algorithms are provided in the original guideline document for:

- The Evaluation and Management of Patients Suspected of Having Acute Coronary Syndrome (ACS)
- Acute Ischemia Pathway
- Revascularization Strategy for Unstable Angina/Non-ST Segment Evaluation Myocardial Infarction (UA/NSTEMI)

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is identified and graded for each recommendation (see "Major Recommendations").

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

- Successful treatment of the two components of acute coronary syndrome, unstable angina/non-ST segment evaluation myocardial infarction, may prevent myocardial infarction and death as well as reduce symptoms of angina and occurrence of ischemia, thereby improving the quality of life.
- In addition, these guidelines may improve the effectiveness of care, optimize patient outcomes, and favorably affect the overall cost of care through a focus of resources on the most effective strategies.

POTENTIAL HARMS

Calcium Antagonists

Side effects include headache, edema, hypotension, worsening of congestive heart failure, bradycardia, and atrioventricular block.

Clopidogrel

Clopidogrel carries the risk of both major and minor bleeding.

Anticoagulants, Including Heparin

Bleeding (major and minor) and heparin-induced thrombocytopenia are potential complications.

Glycoprotein IIb/IIIa Inhibitors

Treatment with glycoprotein IIb/IIIa antagonists increases the risk of bleeding, which is typically subcutaneous or involves the access site of vascular intervention. Thrombocytopenia is an unusual complication of this class of agents.

Nitrates

- Nitrate use within 24 h after sildenafil (Viagra) or the administration of sildenafil in a patient who has received a nitrate within 24 h has been associated with profound hypotension, myocardial infarction and even death.
- Side effects of nitroglycerine include headache and hypotension.

Morphine Sulfate

Side effects of morphine sulfate include hypotension (especially in the presence of volume depletion and/or vasodilator therapy), nausea and vomiting, and respiratory depression.

Aspirin

Gastrointestinal side effects such as dyspepsia and nausea are infrequent with the low doses. Acute gout due to impaired urate excretion is rarely precipitated. Primary prevention trials have reported a small excess in intracranial bleeding, which is offset in secondary prevention trials by the prevention of ischemic stroke.

Coronary Revascularization Procedures

All revascularization procedures carry the risk of intraoperative and postoperative complications, including death.

CONTRAINDICATIONS

CONTRAINDICATIONS

Contraindications to Beta-blocker Use

Patients with marked first-degree atrioventricular block, any form of second- or third-degree atrioventricular block in the absence of a functioning pacemaker, a history of asthma, or severe left ventricular dysfunction with congestive heart failure should not receive beta-blockers on an acute basis. Patients with significant sinus bradycardia or hypotension generally should not receive beta-blockers until these conditions have resolved. Patients with significant chronic obstructive pulmonary disease (COPD) who may have a component of reactive airway disease should be administered beta-blockers very cautiously; initially, low doses of a beta₁-selective agent should be used.

Contraindications to Calcium Antagonists

Rapid-release, short-acting dihydropyridines (e.g., nifedipine) must be avoided in the absence of adequate concurrent beta-blockade in acute coronary syndrome because controlled trials suggest increased adverse outcomes. Verapamil and diltiazem should be avoided in patients with pulmonary edema or evidence of severe left ventricular dysfunction.

Contraindications to Aspirin (ASA)

Contraindications to aspirin include intolerance and allergy (primarily manifested as asthma), active bleeding, hemophilia, active retinal bleeding, severe untreated hypertension, an active peptic ulcer, or another serious source of gastrointestinal or genitourinary bleeding.

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

- These practice guidelines attempt to define practices that meet the needs of most patients in most circumstances. The ultimate judgment regarding care of a particular patient must be made by the physician and patient in light of all of the available information and the circumstances represented by that patient.
- The application of these recommendations with carefully reasoned clinical judgment reduces, but does not eliminate, the risk of cardiac damage and death in patients who present with symptoms suggestive of unstable angina.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Living with Illness

IOM DOMAIN

Effectiveness
Patient-centeredness
Timeliness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

American College of Cardiology Foundation, American Heart Association. ACC/AHA guidelines for the management of patients with unstable angina and non-ST-segment elevation myocardial infarction. A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. Bethesda (MD): American College of Cardiology Foundation (ACCF); 2002 Mar. 95 p. [552 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2000 (revised online 2002 Mar)

GUIDELINE DEVELOPER(S)

American College of Cardiology Foundation - Medical Specialty Society
American Heart Association - Professional Association

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GUIDELINE COMMITTEE

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

The American College of Cardiology/American Heart Association (ACC/AHA) Task Force on Practice Guidelines makes every effort to avoid any actual or potential conflicts of interest that might arise as a result of an outside relationship or personal interest of a member of the writing panel. Specifically, all members of the writing panel are asked to provide disclosure statements of all such relationships that might be perceived as real or potential conflicts of interest. These statements are reviewed by the parent task force, reported orally to all members of the writing panel at the first meeting, and updated yearly and as change occur.

GUIDELINE STATUS

This is the most current release of the guideline.

This guideline updates a previous version: ACC/AHA guidelines for the management of patients with unstable angina and non-ST-segment elevation myocardial infarction. J Am Coll Cardiol 2000 Sep; 36(3): 970-1062.

These guidelines will be reviewed 1 year after publication and yearly thereafter by the Task Force to determine whether revision is necessary. These guidelines will be considered current unless the Task Force revises them or withdraws them from distribution.

GUIDELINE AVAILABILITY

Electronic copies: Available from the American College of Cardiology (ACC) Web site:

- [HTML Format](#)
- [Portable Document Format \(PDF\)](#)

Electronic copies are also available from the [American Heart Association \(AHA\) Web site](#).

Print copies: Single copies are available from ACC, Resource Center, 9111 Old Georgetown Rd, Bethesda, MD 20814-1699; (800) 253-4636 (US only). Bulk reprints are available from AHA, Public Information, 7272 Greenville Ave, Dallas TX 75231-4596; Reprint No. 71-0240.

AVAILABILITY OF COMPANION DOCUMENTS

The following is available:

- ACC/AHA Guideline Update for the Management of Patients With Unstable Angina and Non-ST-Segment Elevation Myocardial Infarction-2002: Summary Article: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee on the Management of Patients With Unstable Angina). Circulation 2002 Oct 1;106(14):1893-900.

Electronic copies: Available from the [American Heart Association Web site](#).

Print copies: Single copies are available from the American College of Cardiology (ACC), Resource Center, 9111 Old Georgetown Rd., Bethesda, MD 20814-1699; (800) 253-4636 (US only). Bulk reprints are available from AHA, Public Information, 7272 Greenville Ave., Dallas TX 75231-4596; Reprint No. 71-0227.

Also available:

- ACC/AHA pocket guidelines for the management of patients with unstable angina and non-ST-segment elevation myocardial infarction.

Electronic copies: Available in Portable Document Format (PDF) from the [ACC Web site](#); or Pocket Guideline Palm Download is available.

Print copies: Available from ACC, Resource Center, 9111 Old Georgetown Rd., Bethesda, MD 20814-1699; (800) 253-4636 (US only). Also available from AHA, Public Information, 7272 Greenville Ave., Dallas TX 75231-4596.

PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on January 30, 2001. It was verified by the guideline developer as of April 27, 2001. This summary was updated on October 3, 2002. The updated information was verified by the guideline developer on June 9, 2003.

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